

MONTHLY WEATHER REVIEW.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by R. F. Stupart, Esq., Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Director Mete-

orological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

IN GENERAL.

In the United States April was exceptionally cold from the Rocky Mountains to the Atlantic coast, and at many points average and minimum temperatures were the lowest recorded in many years. Frosts were frequent in the Gulf and South Atlantic States during the first and second decades of the month. On the 3d light frost occurred over the Florida Peninsula as far south as the twenty-eighth parallel, and was noted on the 14th and 15th in northern Florida. After the 10th frost was frequent in parts of the North Pacific States. At the close of the month freezing temperature was reported in northwestern Texas. In the latter portion of the third decade wintry weather prevailed in Europe, and snow fell in Germany and thence over the northern portion of the Italian Peninsula.

In the Rocky Mountain districts the first half of the month was mild and the latter half cold, with a general deficiency in precipitation. In California the month was a quiet one, with light rainfall. In the North Pacific States there were two rain periods, one from the 4th to the 6th and the other on the 9th and 10th. The heavy rains of the first period produced a bank-full stage of water in the Willamette River at Portland, Ore.

Snowfalls over interior and eastern districts of the United States were the heaviest in many years, if not for the whole period of observation; during the third decade 1 inch to 12 inches of snow fell in the Dakotas, Minnesota, Wisconsin, upper Michigan, and northern lower Michigan. During this period snow and sleet storms occurred in the States of the middle Mississippi Valley, and heavy rains in the Southwestern States. At New Orleans, La., a depth of nearly 7 inches of rain was recorded on the 25th. This storm had prevailed at the close of the second decade on the middle-eastern slope of the Rocky Mountains, where maximum depths of snowfall ranged from 1 foot to 1½ feet. In the second decade snow fell in Tennessee on at least two dates, and the close of that decade was marked by snowstorms in Ohio, Pennsylvania, and New York. In New England the heaviest snowstorm of the month prevailed from the 8th to 10th, when the fall varied from 6 inches on the coast to 12 or 18 inches in the interior.

Referring to the frosts of the second decade in the Middle-western States the Morning Republican, of Springfield, Mo., remarks in its issue of April 17, 1907, as follows:

It is due to the Weather Bureau to state that its forecasts of the recent frosts and freezes have been marvelously accurate. Had the fruit growers of Missouri, all of whom received timely warnings, possessed the same facilities for firing or smudging their orchards as do the orange growers of Florida and California, there would have been little or no loss.

A culminating feature of March weather was a storm development off the extreme southeast coast of the United States, and a cool wave over the eastern districts that followed a period of exceptionally high temperature over the eastern half of the United States. This storm broke a long drought over the Florida Peninsula that had caused considerable damage to gardens and fruit trees that were not irrigated. The storm that developed marked intensity off the southern Florida coast during the opening days of April appears to have resulted from a union of two barometric depressions over that region, one of which had been forced southward over Florida by an area of high barometer to the northward, and the other a depression that had appeared over the Caribbean Sea during the latter part of March. The presence of the latter depression was shown by observations taken at San Juan, P. R., from March 26 to 29. At that station brisk north and northwest winds, with a moderately high sea from the north, prevailed during the night of the 26-27th. The morning of the 27th the sea became very high from the north, and vessels were obliged to stand off the harbor during the 27th and 28th. A very heavy sea from the north continued during the 28th. On the 29th the sea moderated from the west and north, and vessels were able to enter the harbor. The morning of April 1 a well-defined storm was central off the east Florida coast north of Jupiter. In the meantime a gale had sprung up that extended from the southern Florida coast over the western Bahamas and the middle and west Cuban coasts, and continued over those regions until the 3d, with maximum wind velocities 48 miles an hour at Key West the morning of the 2d, and 60 miles an hour at Havana the morning of the 2d. By the morning of the 4th the center of this disturbance had past to a position near and southeast of Bermuda, and by the 6th had merged with an extensive area of low barometer that from the beginning of the month had extended from the British Isles westward over the Atlantic. Storm warnings in connection with this storm were ordered at all ports on the southern Florida coast the evening of March 31.

Storms of unusual severity were occasionally encountered

along the transatlantic steamer routes, those of the second and third decades of the month being particularly severe. Several storms of marked strength visited the Great Lakes during the first and second decades, those of the 7th to 9th, and 11-12th being the most important. The steamship *Arcadia* left the port of Manistee the afternoon of the 12th while storm warnings were displayed and was lost with all on board. The severest storm of the month on the North Pacific coast occurred on the 5th when the wind reached a velocity of 85 miles an hour from the southeast at North Head, Wash.

About 1 a. m. of the 5th a tornado past thru the northern portion of Alexandria, La., killing several persons, wrecking many houses, and overturning an empty passenger train. This storm was apparently one of a group of several severe local storms that visited parts of central and southern Louisiana and southern Mississippi, causing, so far as can be learned, a loss of 15 to 20 human lives, and property destruction aggregating several hundred thousand dollars.

BOSTON FORECAST DISTRICT.

The average temperature for New England was the lowest recorded for April during the last eighteen years. Precipitation was in excess, except in Connecticut. From the 8th to the 10th snow fell to depths that varied from 6 inches on the coast to from 12 to 18 inches in the interior. Attending this snowstorm was one of the severest gales of the season. Timely warnings were issued for the storm, and so far as known, there was no damage to shipping or loss of life.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.—*Not received.*

LOUISVILLE FORECAST DISTRICT.

The month was the coldest April during the period of Weather Bureau observations. Freezing temperatures and frosts were of frequent occurrence. Snow fell over a large portion of Kentucky and Tennessee on the 9th, 10th, and 13th. A severe thundersquall, with heavy hail and a maximum wind velocity of 52 miles an hour, visited Louisville the afternoon of the 7th. Warnings issued in connection with frosts were justified.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

The month was marked by unusual cold over the entire district. Open ports on Lake Michigan were advised regarding storms of the first decade of the month. The display of storm warnings on the Great Lakes was resumed for the season on the 10th. Storm warnings were ordered for the upper Lakes the night of the 11th and on the morning of the 12th. The steamship *Arcadia*, that left Manistee the afternoon of the 12th while the storm warnings were flying, foundered on Lake Michigan and was lost with all on board. Storm warnings were again hoisted on the 15th and 24th.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

During the first half of the month temperatures were generally above the seasonal average. During the latter half cold was marked and prolonged on the eastern slope of the Rocky Mountains, and in the eastern counties of Colorado the average temperatures for the month were the lowest in twenty years. Frosts and freezing temperatures, for which warnings were issued, occurred, except in southern Arizona. Precipitation was deficient, except in eastern and southwestern Colorado and northern New Mexico. Exceptionally heavy snow occurred on the 19th and 20th.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

The month was on the whole quiet, with unusually light rainfalls. The depressions that appeared were of moderate intensity. No storm or frost warnings were issued.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

Nearly all the precipitation of the month fell from the 4th to the 6th, and on the 9th and 10th. The rains of the first period were attended by severe gales and by a bank-full stage of water in the Willamette River at Portland. After the 10th the weather was dry, with cool nights and frequent frosts the occurrence of which in nearly every instance was forecast twenty-four hours in advance.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The crest of the March flood past Memphis on March 30 and 31, and reached the mouth of the river about the middle of April. Stages were, as a rule, somewhat above flood heights, but no damage has been reported.

Warnings giving the time and height of the flood crest were issued from five to twelve days in advance, and the difference between the forecast and the actual stages averaged but a few tenths of a foot.

There was also some moderately high water in the upper Mississippi River due to the run-off from the melting of the accumulated winter snows in Minnesota and Wisconsin. Flood stages were not quite reached, except at Leclaire, Iowa, and Hannibal, Mo., where they were slightly exceeded.

Warnings of the flood were issued in the Davenport, Iowa, district, which extends from just below Dubuque to Davenport. They were nearly a week in advance of the flood, and the final warnings, from three to five days in advance of the crest, were correct to within 0.2 foot. There was very little flooding, property in danger from seepage water was removed, and the damage was comparatively trifling.

Warnings for the flood in the vicinity of Hannibal were also very accurate. Some unprotected lowlands were overflowed, but no material damage resulted.

The Ohio River fell steadily without special incident, while the Missouri River changed but little.

Navigation opened for the season at Dubuque, Iowa, on the 1st, and at St. Paul on the 19th.

The abnormally high temperatures of the closing days of March caused a rapid melting of the remaining snow and ice in the upper Connecticut Valley, and warnings were issued on March 30 for the flood stage of 16 feet at Hartford, Conn., on the following day. The flood wave, however, was delayed somewhat, and the crest stage of 16 feet was not reached until the morning of April 1.

There were no other high waters, except in the lower Red River of the North, where the usual flood stages incident to the breaking up of the ice in the spring were experienced. Warnings for the river north of Moorhead, Minn., were first issued on March 27, and repeated almost daily until April 15. The highest stage reached at Moorhead was 29.8 feet, on March 30 and 31, 3.8 feet above the flood stage, and at Drayton, N. Dak., about 34 feet on April 15.

No ice was observed in the Missouri River below the mouth of the James River, and all above had disappeared by the 12th.

The ice in the Penobscot River at Mattawankeag, Me., went out on the 17th, and the last ice was seen at West Enfield, Me., on the 23d.

The highest and lowest water, mean stage, and monthly range at 309 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*